Listing of the Claims:

The following is a complete listing of all the claims in the application, with an indication of the status of each:

Claim 1. (Currently amended) A method of measuring a radial gradient index distribution n(r) of a rod lens by calculating higher-order index distribution coefficients indicating said gradient index distribution n(r) when n(r) is given by the expression:

$$n(r)^2 = n_0^2 \times \{1-(gr)^2 + h_4(gr)^4 + h_6(gr)^6 + h_8(gr)^8 + \ldots\}$$

in which r is a radial distance measured from an optical axis, n_0 is a refractive index on the optical axis, g is a secondary index distribution coefficient, and h_4, h_6, and h_8 are higher-order index distribution coefficients, said method comprising the steps of:

(1) processing said rod lens so that an optic-axial length of said rod lens is approximately equal to P/2 (in which P represents a paraxial period length (pitch) defined as P=2p/g) or approximately equal to an integer multiple of P/2 and so that opposite end surface of said rod lens are shaped like parallel planes;

(2) setting a patterned surface as an object surface in the proximity of one end surface of said rod lens and forming an image surface in the proximity of the other end surface of said rod lens by irradiating said patterned surface with condensed monochromatic light;

(3) obtaining the position of a paraxial focal point and the curve of curvature of field by observing said image surface;

(4) calculating back higher-order index distribution coefficients $\underline{h_4, h_6, \text{ and } h_8}$ by a fitting process on the basis of said position of the paraxial focal point and said curve of curvature of field.

Claim 2. (original) A method of measuring a gradient index distribution of a rod lens according to claim 1, wherein said patterned surface has a striped structure in which a large number of straight lines are arranged in parallel with one another or a lattice structure in which a large number of straight lines are arranged crosswise and in

parallel with one another so that positions of focal points on a plurality of lines are measured in a direction of the arrangement of lines from a center of said lens to thereby obtain curves of curvature of field of meridional image surface in accordance with distances from the optical axis of said lens.

Claim 3. (currently amended) A method of determining higher-order index distribution coefficients h_4, h_6, and h_8~~...~~ to define a gradient index distribution n(r) of a rod lens:

$$n(r)^2 = n_0^2 \times \{1-(gr)^2 + h_4(gr)^4 + h_6(gr)^6 + h_8(gr)^8 + \ldots\}$$

in which r is a radial distance measured from an optical axis, n_0 is a refractive index on the optical axis, and g is a secondary index distribution coefficient, said method comprising the steps of:

(1) obtaining an image of a predetermined pattern through the rod lens;

(2) obtaining data of positions of meridional focal points on terms of distances from the optical axis of the rod lens based on the obtained image;

(3) fitting a curve, which defines target meridional ~~forcal~~ focal points in terms of the distances from the optical axis and is determined based on the gradient index distribution n(r), onto the obtained data using the higher-order index distribution coefficients h_4, h_6, and h_8 ~~...~~as variables, whereby values of the higher-order index distribution coefficients h_4, h_6, and h_8~~...~~ are determined.

Claim 4. (Currently amended) A measuring apparatus for obtaining higher order index distribution coefficient of a gradient index rod lens, comprising:

a light source;

a microscope;

a movable stage located between the light source and the microscope, and providing a predetermined pattern onto which the gradient index rod lens is placed;

a linear gage which obtains height data of the movable stage;

a CCD connected to the microscope to obtain an image of the predetermined pattern through the rod lens and the microscope; and

a computing unit connected, at least, to the CCD and the linear gage to obtain data of the image from the CCD and the height data from the linear gage,

wherein the computing unit has a storage medium storing therein a program which executes a method comprising the steps of:

(1) obtaining the data of the image of the predetermined pattern through the rod lens, the microscope and the CCD, and the height data through the linear gage;

(2) obtaining data of positions of meridional focal points in terms of distances from the optical axis of the rod lens based on the obtained image data and height data;

(3) fitting a curve, which defines target meridional focal points in terms of the distances from the optical axis and is determined based on the gradient index distribution n (r), onto the obtained data using the higher-order index distribution coefficients h_4, h_6, and h_8 as variables, whereby values of the higher-order index distribution coefficients h_4, h_6, and h_8 are determined.

Claim 5 (Canceled)

Claim 6. (Original). The measuring apparatus according to claim 4, wherein the computing unit calculates the higher order index distribution coefficient based on the data of the image and the height data.

Claim 7. (Original). The measuring apparatus according to claim 6, wherein the computing unit has a display device which displays the calculated higher order index distribution coefficient.